## REMARKS

Reconsideration and allowance are respectfully solicited.

Applicants have cancelled claims 1-117 and added new claims 118-181. The new claims correspond substantially to claims 1-32 and 40-71 as presented in the Amendment filed on February 8, 2006. In the Office Action dated, May 3, 2006, the Examiner indicated that then pending claims 1-78 overcame the rejections based on 35 U.S.C. Sections 112 and 103. The new claims have been drafted to recite more clearly the physical aspects of the invention. Accordingly, the new claims are believed to overcome the outstanding rejection based on 35 U.S.C. Section 101 for the reasons set forth below.

Although the claimed invention utilizes mathematical algorithms, the invention does so in a way to achieve a useful and tangible result. The invention relates to creating models of physical systems. The invention allows partial differential equations, representing physical properties of a system, to be solved to predict behavior of the physical system.

Solving partial differential equations pertaining to related physical properties is a vital aspect of sophisticated product design in some industries. For example, in an electric motor design, determining the temperature of and electric current density through the core of the motor, as a function of position in one or more dimensions, is a very important step toward ensuring that the electric motor design can meet its performance goals without overheating.

In this example, several interrelated physical effects contribute to making the temperature and electric current density analysis particularly difficult. First, current density naturally has a positional dependence, due to the skin effect (which explains why current density is far greater at the outer edges of a conductor). Second, temperature at a position is dependent on the thermal conductivity of the material at that position and on that position's distance from a boundary with another material. Third, the temperature and current density at a position in the core are interrelated. Specifically, the temperature at a position in the core affects the conductivity of the conductor at that position and thus, the current density at that position; as temperature increases, current density decreases. Additionally, the current density at a position in the core affects the temperature at that position; as current density

increases, temperature increases. Combining these conflicting physical relationships, an increasing current density leads to an increase in temperature, up to a point where the increased temperature limits further increases in current density by reducing the conductivity of the current-carrying material.

Equations representing physical properties, such as heat transfer and current density, are well known to those skilled in the art. However, analytic solutions of a system of equations involving multiple physical properties (hereinafter "multiple physics") are often unavailable due to a theoretical inability to solve such equations. Therefore, computer programs such as FEMLAB™ have been developed to solve such equations using numerical analysis techniques.

Importantly, the success of a numerical solver program is largely dependent on the quality of the equations communicated to the numerical solver program. Although prior art solutions are capable of building an adequate model for some multiple physics problems, thereby allowing numerical analysis to solve for those multiple physics problems, prior art techniques are often inadequate. The invention broadens the range of multiple physics problems that can be solved by creating an improved model to be used for analysis of the physical system.

The invention utilizes couplings between local and non-local variables in the model to improve the quality of the model. The use of such variables within the model allows the numerical analysis program to solve systems of equations that may otherwise be unsolvable by prior art means. The inventive method uses mathematical algorithms to selectively perform translations on the model related to the local and non-local variables, but the inventiveness lies in identifying where in the model to apply such translations rather than on such mathematical translations in the abstract. In this way, the inventive method goes well beyond mere application of mathematical principles, but rather, intelligently applies such principles as-needed to obtain a specific result. That result is a computer model whose advantageous characteristics allow prediction of a physical system.

An example of a useful, concrete and tangible result is provided in State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. ("[T]he transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical

algorithm, formula, or calculation, because it produces `a useful, concrete and tangible result' - a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades"). As in State Street, the present invention transforms data, in the form of a series of partial differential equations representing phycial systems, by a machine through a series of mathematical algorithms into a model representing behavior of physical properties of a combined physical system.

In light of the foregoing discussion, applicant submits that the claims do not preempt every substantial practical application of certain mathematical algorithms.

The new claims address all prior art rejections. The prior art of record fails to teach or suggest the claimed invention. For example, the prior art fails to teach or suggest the use of at least one non-local coupling for determining a representation of a partial differential equation .

In view of all of the foregoing, Applicants submit that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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